Modern School Construction

TRUSSED
CONCRETE
STEEL CO.

DETROIT, MICH.

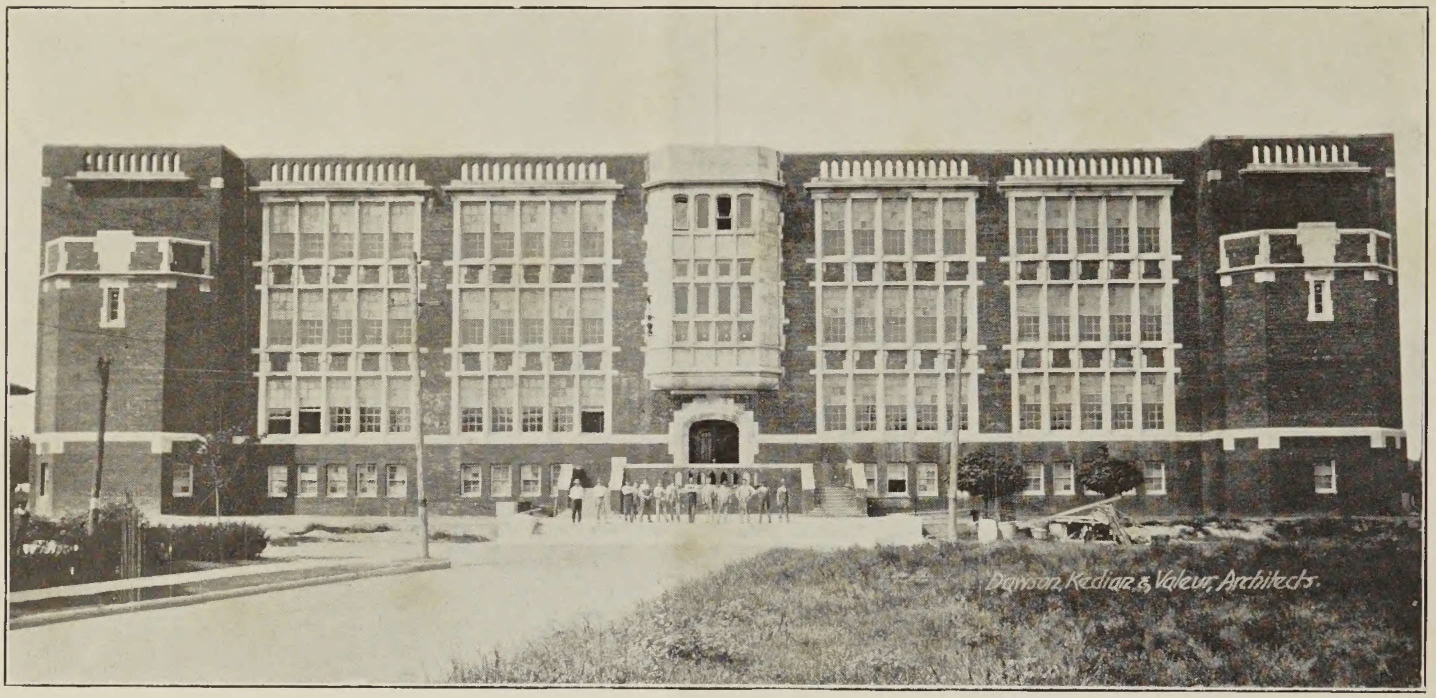
10

MODERN SCHOOL CONSTRUCTION

FIREPROOFNESS
SOUNDPROOFNESS
DAYLIGHTING
SANITATION
ECONOMY

KAHN Building Products TRUSSED CONCRETE STEEL CO

TRUSSED CONCRETE STEEL CO.
DETROIT, MICH.



Dawson, Kedian & Valeur, Architect.

High School, Muskogee, Okla.

Built Kahn System of Reinforced Concrete.

Charles Granville Jones, Architect.

High School, Bloomfield, N. J.

Built Kahn System Reinforced Concrete.

Safety in School Construction.

Many advances have been made during recent years in the design and construction of school buildings. Scientific study and thorough investigation has been given to such features as the arrangement of rooms, better lighting, improved ventilation, modern sanitation, fireproofness, soundproofness and economy. The many improvements in modern schools have resulted in a higher standard of scholarship and of health among the students.

"Safety First" is a brief expression which indicates the prominence of the present-day movement for the better protection and safeguarding of human lives. Nowhere should this appeal have a greater consideration than in the construction of school buildings. Here are housed hundreds of little children with neither the strength nor the experience to protect themselves in the face of such dangers as fires.

The necessity for fireproof construction of schools is now generally recognized by School Boards and tax payers. There is no need to picture the horrors of a Collingswood calamity nor the long list of school fires occurring every year. The lessons of these disasters have been well learned by thinking people. The laws of many States now require fireproof construction throughout for schools of any size, and even in the smaller buildings fireproof corridors, stairs and boiler rooms. There is no doubt but that every section of the country will adopt similar laws in the near future.

The cost of fireproof construction has been greatly reduced by the introduction of reinforced concrete in building schools. Fireproof, modern schools now cost little if any more than the old style, inflammable building, with masonry walls and wood joists. Reinforced concrete is used in many parts of the building, including floors, roofs, stairs, partitions, ceilings, etc. The exterior design may be of masonry, brick or concrete as desired.

The proper distribution of daylight throughout the rooms (usually obtained from one side only) requires serious consideration in the construction of the windows. The use of modern steel sash assures maximum daylight from the window openings. There are no wide mullions or muntins to obstruct the light.

The following pages indicate a few suggestions for the proper construction of schools, as well as a number of photographs of typical installations. The wide extent to which Kahn Building Products have been used in school buildings has given our engineers an exceptional experience along these lines. Their suggestions are sure to be useful and are furnished free of all obligation.

Floor Construction for Schools.

FIREPROOFNESS: By making the floors of schools fireproof, the greatest fire danger is eliminated, because the fire can then be confined to one locality without communicating to floors above or below. The earlier methods of constructing fireproof floors usually involved steel girders with heavy arches. The great expense of such construction often made its use prohibitive. The introduction of reinforced concrete not only reduced this cost but brought many other advantages, such as flat ceilings, lighter weight, simplicity, etc. Various types of reinforced concrete are used, including steel Floretyle, reinforced terra cotta tile, reinforced solid concrete, etc., as indicated in the following pages.

SOUNDPROOFNESS: Floors of reinforced concrete are soundproof—an important advantage in schools. Steel Floretyle and reinforced terra cotta tile are very superior in this respect, owing to the insulating qualities of the dead air spaces in the tile. No noise or sound can possibly be communicated between floors.

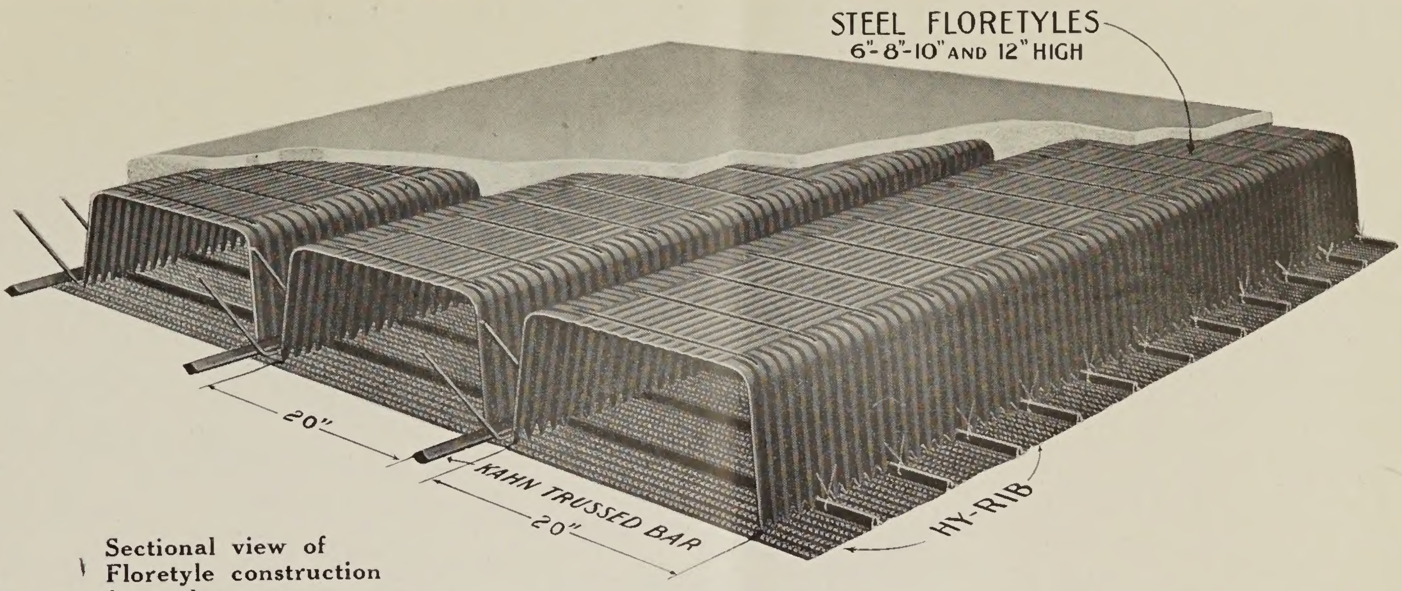
STRENGTH AND SAFETY: Numerous tests under severe conditions by Public Building Bureaus and on actual installations have repeatedly demonstrated the exceptional strength of reinforced concrete construction. These tests include not only heavy load, but severe fire tests. The test loads on actual floors have often been four times the required carrying capacity, without showing any signs of weakness. Reinforced concrete floors are also very rigid and free from vibration, as demonstrated in many industrial buildings where heavy vibrating and pounding machinery is placed directly on the floor.

SANITATION: Reinforced concrete floors insure the best sanitary conditions. Being of masonry construction there is no lodging place for germs or vermin of any kind. Compare this with wooden construction with its open timbers and its tendency to become damp and unsanitary.

ECONOMY: Reinforced concrete is much more economical than any other construction when one considers its permanence and the saving of insurance. As a matter of fact, when reinforced concrete floors are properly combined with other features of the construction, the first cost is little if any more than the old style buildings with wood joists. Its economy in the long run can be readily demonstrated by actual comparative figures.

FLAT CEILINGS: School rooms are ordinarily from 20 to 30 feet in width and it is desirable to have a flat ceiling over them with no projecting beams to collect dirt and interfere with lighting. This is readily accomplished on long spans by the use of Floretyle or reinforced terra cotta tile construction, and in shorter spans by reinforced solid concrete. In all cases the floor construction spans the full width of the room, giving an absolute flat ceiling free of all beams and projections. Compare this with the earlier types of fireproofing with steel girders, which not only had beams projecting below the ceiling, but which were considerably more expensive.

FLOOR FINISH: Any type of finished floor may be laid upon the reinforced concrete construction. Ordinarily a wooden floor is desired and can be readily obtained by placing small wooden sleepers on top of the construction, filling in between them with cinder concrete and attaching the finished floor to them. Finished floors of cement, tile, terrazzo or composition are often laid on the concrete construction, particularly in corridors, auditoriums, etc.



Sectional view of Floretyle construction from above.

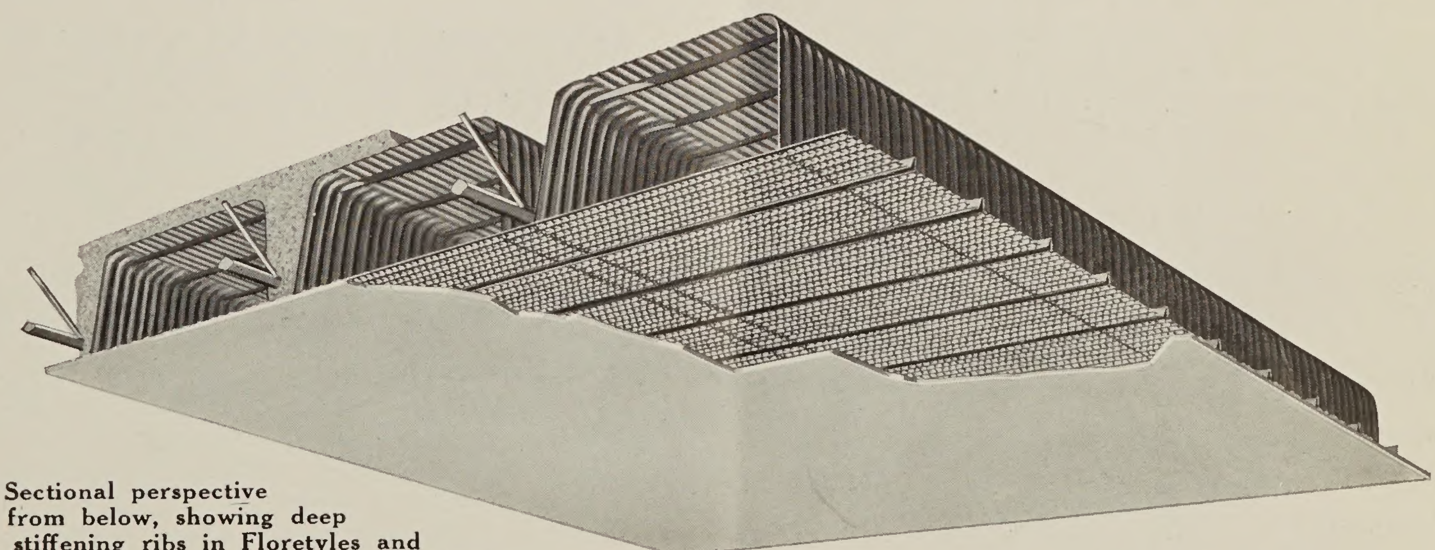
Steel Floretyles, the Ideal Construction for Floors in Schools.

Steel Floretyle construction as shown in the illustration, consists of rows of hollow steel tile, separated by reinforced concrete joists and covered with a thin layer of concrete. These narrow joists carry the loads directly to the supports, while the Floretyle act merely as fillers, saving concrete and reducing dead weight. Hy-Rib extends continuously underneath and provides a flat ceiling and a perfect surface for plastering.

The many advantages of Steel Floretyle Construction make it particularly adapted for school floors. Flat ceilings over all rooms are assured as spans up to 30 ft. and greater can be readily secured without the use of any intermediate beams. Furthermore, this ceiling construction is light in weight, owing to the heavy masses of concrete that are saved by the hollow Floretyle. The reduced weight makes a corresponding saving in all the supporting construction.

Soundproofness of floors is assured by the insulating qualities of the dead air space formed by the Floretyle. These open spaces also greatly simplify the location and the installation of ventilator flues of which a great many are required in modern schools; also conduits and pipes can be readily carried along the length of the Floretyle without cutting or weakening the construction.

The great strength of Floretyle construction has been repeatedly demonstrated by elaborate tests, and hundreds of installations in important buildings. The Railway Exchange Building in

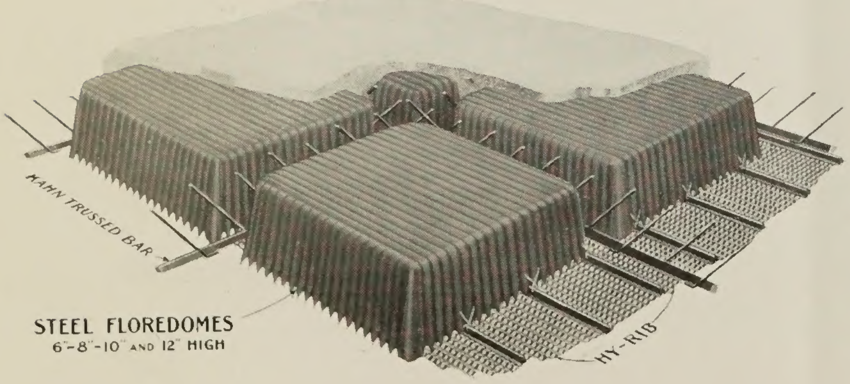


Sectional perspective from below, showing deep stiffening ribs in Floretyles and flat ceiling of Hy-Rib, partly plastered.

Use of Floretyles at Couzens Building, Detroit, Mich.
Note the true lines of joists and the great rigidity of Floretyles.

St. Louis is a block square, twenty-one stories high, and contains over thirty acres of Floretyle construction. A full-sized panel of this Floretyle construction was built under severest weather conditions and tested with a load of 491,651 lbs., without showing any sign of weakness. Numerous other tests have been made, such as for the Marcus-Whitman School described on next page. Floretyle construction has been approved and passed by the Building Bureaus of all principal cities of the country.

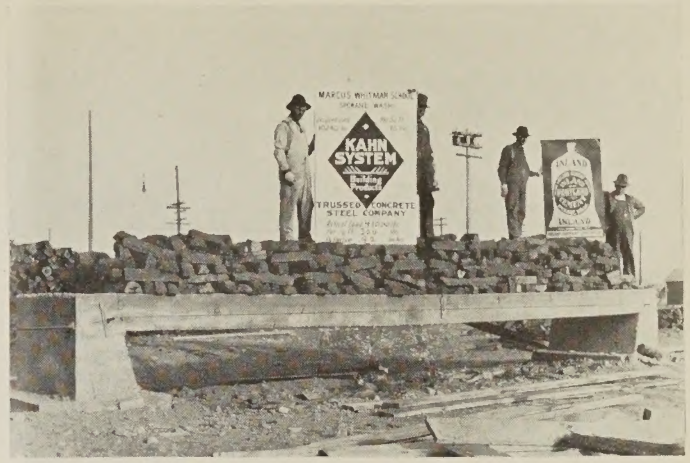
Floretyle construction is very simple to install. Labor, time and material are saved by the simplicity of the centering, the large size of the Floretyles and the wide spacing of the joists. This construction can be used with equal success in all parts of the country, as the Floretyle and reinforcement are readily shipped at low freight rates.



Floredome Construction.

Steel Floredomes present all the advantages of Floretyle construction, but are adapted for two-way construction in which the loads are carried in two directions to the supports. The metal domes are deeply corrugated to secure stiffness and are only open on the underside, so that the joists extend on all sides of the dome.

Load 30,800 lbs.; 225 lbs. per sq. ft.
Deflection .56 in.



Load 41,000 lbs.; 300 lbs. per sq. ft.
Deflection .92 in.

An Exhaustive Test on Floretyle Construction

for Marcus Whitman School, Spokane, Washington.

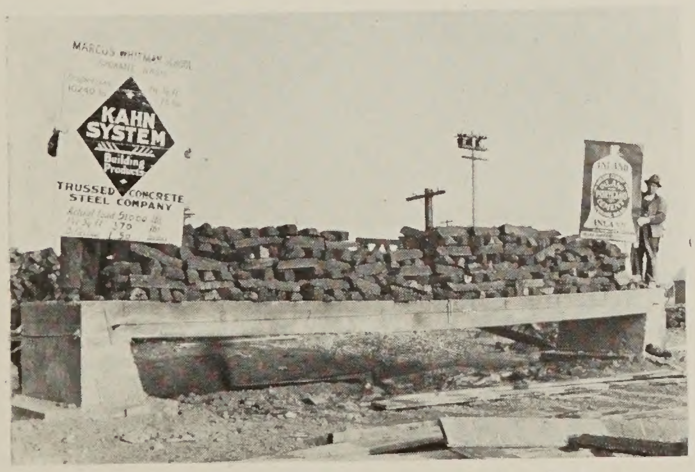
In this remarkable test Floretyle Construction developed a strength five times as great as the load for which it was designed. The test was conducted prior to the construction of the Marcus-Whitman School on a full-sized panel having a clear span of 26 feet and width of 5 feet 3 inches. The construction was designed for a safe live-load of 75 pounds per square foot.

The floor consisted of three concrete joists, each reinforced with one Kahn Trussed Bar and separated by steel Floretyle of standard design, 10 in. deep and 20 in. wide. The total thickness of the slab was 13 in. The test was conducted very carefully with the co-operation of the City Engineer and his assistants. Deflections were accurately measured at 9 points in the span by means of instrument readings upon bolts imbedded in the concrete.

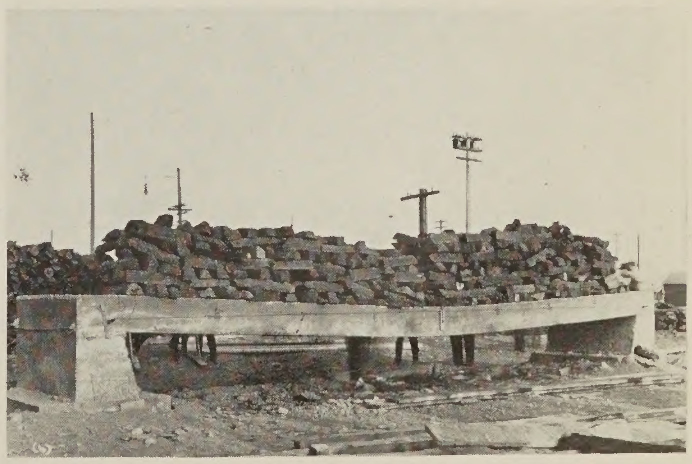
The slab was originally loaded with 20,500 lbs. of pig iron equal to 150 pounds per sq. ft., with a maximum deflection of 13/32 in. After the removal of the load, the slab returned to practically its original position.

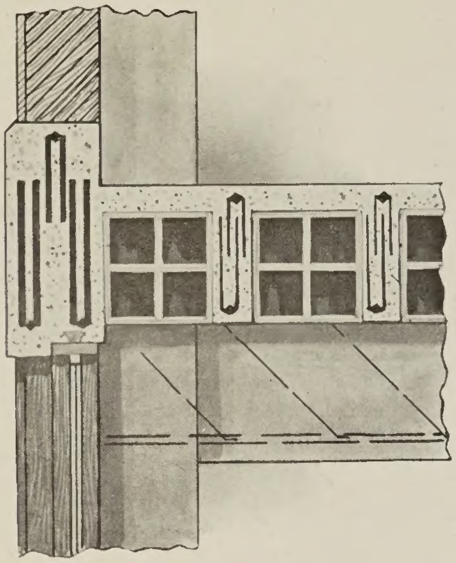
On the following day, the slab was tested to its ultimate carrying capacity. Under a loading of 20,500 pounds, the deflection was .27 inch, equivalent to 1/1100 of the span, while the City Building Code allows a deflection as great as 1/700 of the span. No cracks nor signs of weakness were apparent under this loading.

The test was continued and the deflections under loadings of 30,800 pounds, 41,000 pounds, and 51,000 pounds, were .56 inches, .92 inches and 1.5 inches. Above this loading the deflections increased gradually until over six inches before failure occurred at 52,000 lbs. This load is equivalent to 375 pounds over every square foot of floor, or five times the load for which the slab was designed. This test, as well as numerous others, prove conclusively the wonderful strength, safety, and rigidity of Floretyle Construction. See photograph of Marcus Whitman School, page 38.

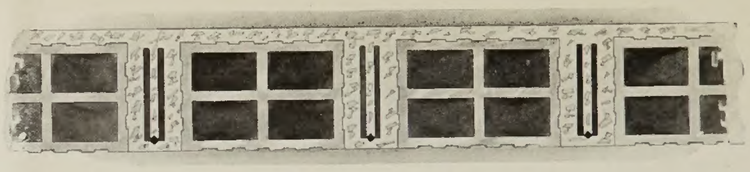


Load 51,000 lbs.; 370 lbs. per sq. ft. Deflection 1.50 in. Designed for 10,240 lbs. (75 lbs. per sq. ft.)

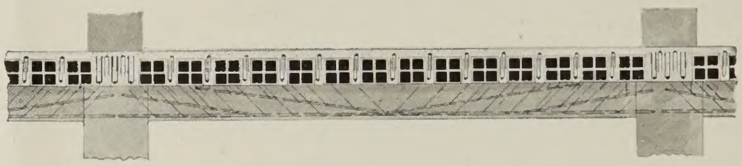

Deflection of 6 in. before Gradual Failure at Center Under Load of 52,000 lbs. (375 lbs. per sq. ft.) Five times the designed load.



Detail of Window Framing Into Concrete Lintel Beam.



Cross Section Reinforced Hollow Tile Floor.



Detail of Framing Reinforced Concrete Columns, Beams and Floors.

Reinforced Hollow Terra Cotta Tile Construction.

Terra Cotta Tile Construction possesses many of the advantages of Steel Floretyle Construction, but to a much more limited degree. In this construction also, the hollow tile are separated by reinforced concrete joists which carry the full weight of the construction, assuring flat ceilings of long span, extending across the width of the room. Terra Cotta Tile, however, is much heavier than Steel Floretyle and, therefore, increases the weight of the floors; also the joists are 16 in. instead of 24 in. on centers, requiring more concrete and increasing the labor in placing. Terra Cotta Tile is limited for use in localities near tile plants; otherwise the freight on the tile would make it too costly. This construction is thoroughly soundproof and fireproof, allows simple installation of ventilator flues and conduits, and has been very extensively used throughout the country in the construction of school floors.

Reinforced Solid Concrete Construction.

Solid concrete reinforced with steel is frequently used for floors of schools, but is only recommended for shorter spans, less than 12 ft. For greater spans its weight would be excessive and Steel Floretyle or Terra Cotta Tile should be used. Where a solid concrete construction is desired for longer spans, intermediate beams of reinforced concrete are used. These beams span the width of the room and are spaced 4 ft. to 8 ft. apart, supporting a thin reinforced concrete slab. This type of construction affords ample strength but has the disadvantage of projecting beams which collect dirt, interfere with lighting and are unsightly in appearance. Solid concrete is also not as soundproof as Floretyle or Terra Cotta Tile, and presents greater difficulties in the location of conduits and ventilators.

E. H. Potter, Architect.

Stairs and Corridors, High School, Glens Falls, N. Y. (See Photograph Page 31).
Kahn System Reinforced Concrete Stairs and Floors.

Reinforced Concrete Corridors and Stairs

No matter what type of construction may be used in the rest of the building, the Corridors and Stairs should be built absolutely fireproof, so as to provide safe means of exit and to delay the spread of the fire. The floors of the corridors are built of any of the various types of reinforced concrete previously described. Stairs and stair landings are constructed of solid concrete reinforced with steel and can be of any desired design to suit all requirements. Corridors and stairs built in this way have the greatest possible resistance to fire.

Floors Over Boiler Rooms

All floors over boiler rooms or fuel storage rooms should be of the best possible fireproof construction of reinforced concrete. This is imperative, no matter what the construction of the rest of the building may be. Fires very frequently originate in boiler rooms and by using a precaution of this kind, at least one of the fire dangers is eliminated.

General Features of Construction

The use of fireproof construction for floors in schools has often consisted merely in the substitution of reinforced concrete for wood joists without affecting in any way the general arrangement of supporting walls, both exterior and interior. In such a construction these walls are built heavy enough to support the floor construction, which spans directly between them. The light weight of Floretyle construction greatly reduces the loads coming on such walls.

A considerable saving in the cost of the school is effected by using a frame work of reinforced concrete girders supported on columns in place of the heavy interior walls, which then become merely dividing partitions. As these partitions do not carry any loads, they can be built very thin of Hy-Rib construction (see page 12), being only 2 in. thick. The saving in space is over 12 in. in the width of each room as a 17 in. brick wall would ordinarily be required. This makes a considerable reduction in the width of the building, effecting material savings in all parts of the construction and greatly reducing the total cost of the school. Savings of this nature will often counterbalance the slight additional initial cost of fireproof construction.

Some designers carry the same system of supporting girders and columns into the outside wall construction, using what is known as skeleton frame design. Outside walls then become light curtain walls which do not carry any loads, as the floors are carried at each floor level by girders and columns. The concrete construction is often left exposed on the exterior but some designers prefer to veneer it with layer of brick or terra cotta. Skeleton frame construction often presents decided advantages in speed and economy, as the entire framework of floors, girders and columns is erected in one operation without the delays occasioned by building supporting walls.

Any type of floor designs, previously described, may be used in connection with the above general methods of construction. Variations or combinations of them may be adopted to suit individual requirements. Our engineers would be glad at all times to make suggestions as to the most economical and satisfactory construction.

Semi-Fireproof Construction

Occasionally in small schools it is desired to reduce the cost of construction to a very low figure and at the same time secure a construction of some fire resistance. For such buildings, the old-style wood joists may be retained but in place of the wood lath ceiling, use metal lath, plastered with cement mortar. Also use this metal lath for all partitions and furring. This metal-lath-cement construction possesses considerable fire-resistance and materially retards the spread of flames.

Old school buildings with wood joists and studs can be remodeled so as to be made at least partially fireproof by the use of metal lath and cement plaster in ceilings, partitions and walls.

Leading Architects and Contractors Endorse Kahn System Construction.

Malcomson & Higginbotham,
Architects,
Detroit, Mich.

"The Kahn System of Reinforcement as installed in several of our recent Detroit Schools has proven very satisfactory, not only on account of its simplicity, but because also of its evident economy and permanency.

"Though seemingly long in coming, we believe that the day has now passed when anything but fireproof construction will be used in Detroit School buildings."

Hewitt & Bottomley,
Architects,
526 Fifth Avenue,
New York.

"In grammar and high school buildings at Southampton, Long Island, we found Floretyle system of floor construction economical and satisfactory. On tests made August 16th, 1913, before the Board of Education, the deflection for 22 ft. span, typical class room floors was only one-tenth inch. For concrete work of this kind .66 inch deflection would be allowed in good engineeering practice. We consider the Floretyle system as tested under our supervision exceedingly satisfactory."

Richards, McCarty & Bulford,
Architects,
Columbus, Ohio.

"We have used the Kahn System Floretyle construction and found it very satisfactory."

Vernon Redding,
Architect,
Mansfield, Ohio.

"I am well pleased with Steel Floretyle construction as used in large business blocks here."

W. H. Isgrigg & Son,
Architects,
Pontiac, Mich.

"We have used combination Steel Floretyle and Hy-Rib Construction on the Pontiac High School, and it has been entirely satisfactory."

Burrowes & Wells,
Architects,
Detroit, Mich.

"We do not hesitate to express our complete satisfaction in the use of Kahn System products and in their business methods, having used their various types of tile and solid concrete construction. They are a large, experienced and thoroughly reliable institution, and judging by our success in the use of their materials and methods, we feel that you need have no hesitancy in accepting their suggestions."

Mildner & Eisen,
Architects,
Detroit, Mich.

"We have used Kahn System in many important buildings and in all cases they have proved very satisfactory in every respect. We are glad to recommend Trussed Concrete Steel Company's materials and also their prompt attention to all contracts."

F. O. Engstrum Company,
Contractors,
Los Angeles, Calif.

"We are general contractors and have used Steel Floretyle construction in three large apartment house buildings of our own. We find it to be most economical and satisfactory in every way."

Frank N. Cooper,
Contractor,
Detroit, Mich.

"I have used Steel Floretyle Construction in the Detroit Home and Day School with great success. I am immensely pleased with this type of construction and the excellent results obtained, and cheerfully recommend it."

Almion Engineering & Contracting Co.,
Contractors,
New York.

"We have used Floretyle construction in several school buildings and without doubt found it the best product of its kind for floor construction."

John Lowry, Jr.,
Contractor,
New York.

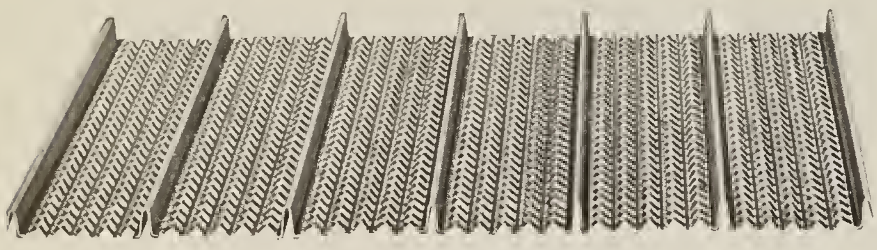
"We have used Floretyle construction extensively with great satisfaction. In every case our test on completed work showed this system to be more than claimed. Rigid care and best workmanship are fundamental with us and with these premises, there is no better system."

Hurley Mason Co.,
Contractors,
Portland, Ore.

"We have built many buildings, using Floretyle construction, including several hotels, one of which we own. We have had no complaints concerning the passage of sounds through these floors. We believe the hollow features make these floors more soundproof than the solid slab."

Solid Hy-Rib Partitions.

Hy-Rib is a steel sheathing stiffened by deep ribs formed from the same sheet of steel. The large sheets of Hy-Rib are attached at floor and ceiling, plaster is applied to both sides and the partition is complete. No studs or channels are required, and the expense of wiring lath to studs is eliminated. Grounds for attaching base boards or picture moulds are readily placed before plastering.



Seven-Rib Hy-Rib.
One of Three Types Furnished.

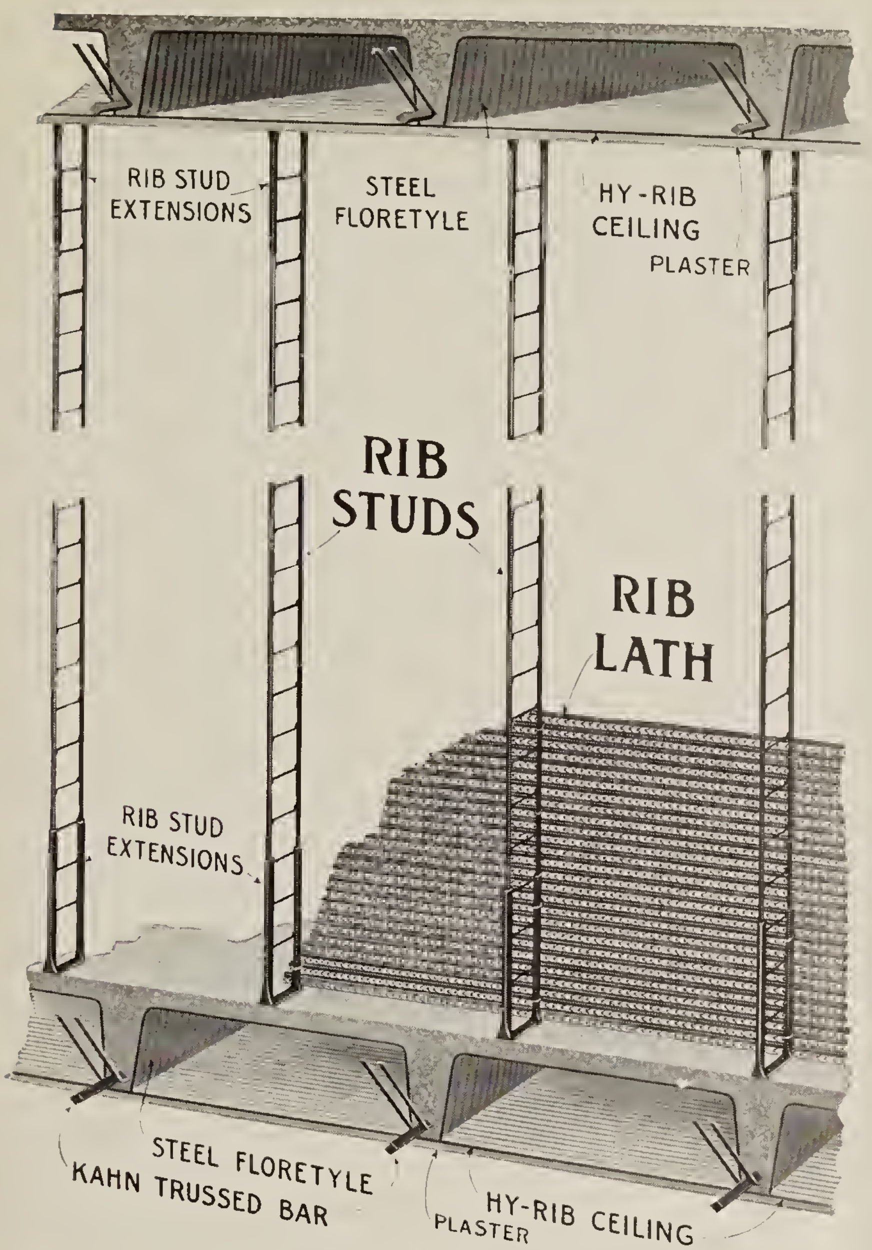
Hy-Rib Partition, Trussed Concrete Building, Detroit, Mich.
Note grounds for base-board and chair-rail.

Hy-Rib partitions are not intended to support loads, but are used generally for subdividing the interior into rooms. Hy-Rib provides the best construction for all non-bearing partitions and in fact for all interior walls, where a framework of girders and columns support the floors.

The completed Hy-Rib partition, being less than 2 in. in thickness, greatly increases the size of all rooms. Consider the great saving in space as compared with 6 in. to 8 in. required for partitions of Terra Cotta Tile or wood studding. By using the Hy-Rib partitions throughout, the size and cost of the school building can be considerably reduced owing to the great saving in space.

Hy-Rib partitions plastered with cement mortar are absolutely fireproof, as has been demonstrated by tests of the New York Building Bureau and others. These partitions have exceptional strength and rigidity. The soundproof qualities of solid monolithic Hy-Rib partitions have been proven by actual tests as well as by practical use in schools, hotels, apartment houses, etc.

Complete specifications and details for the construction of Hy-Rib partitions are given in our Hy-Rib Hand Book which will be forwarded on request.



Hollow Walls or Partitions.
Rib Lath wired to Rib Studs.

A. A. Post, Architect.

Hy-Rib Ceilings, Mount St. Joseph Academy, Buffalo, N. Y.

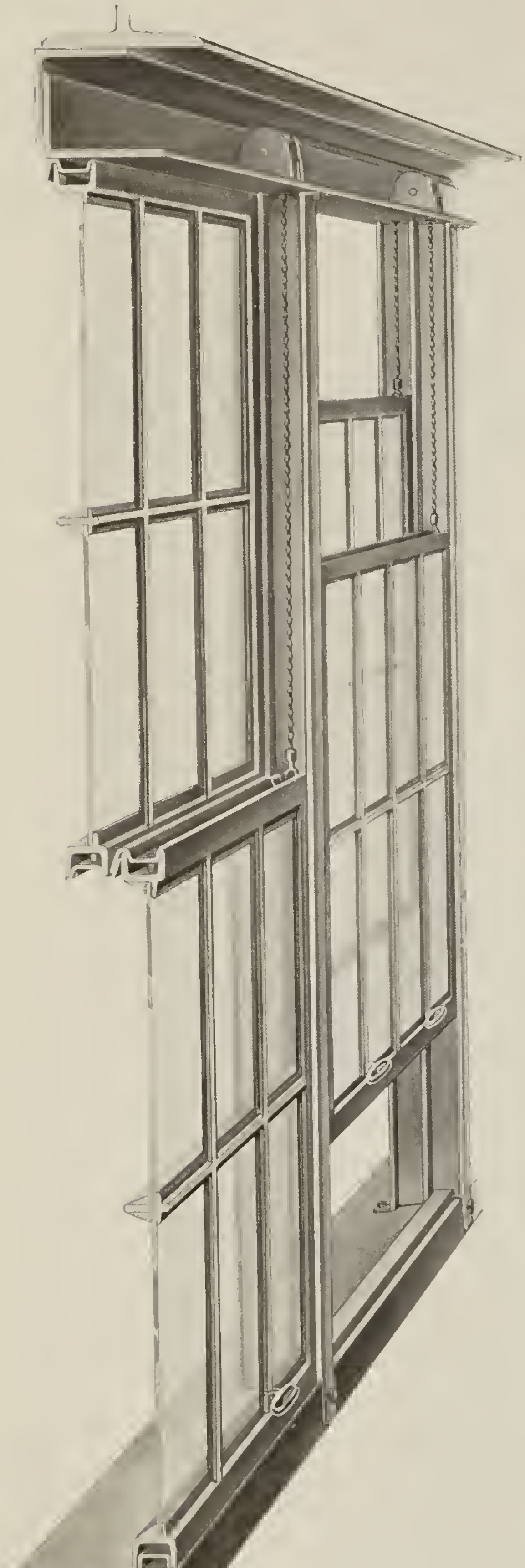
Hollow Partitions of Rib Lath and Rib Studs

In some instances where many pipes have to be carried through partitions, it is desirable to have a hollow fireproof construction. A combination of Rib Studs with Rib Lath is ideal for this purpose. Rib Studs, as will be noted, consist of two vertical steel members rigidly connected by cross ties formed from the same section of steel. The studs have exceptional stiffness and at the same time are open for the passage of pipes or conduits in any direction. This design also affords an uninterrupted air space between the two plastered surfaces, adding to the insulating qualities of the partition. Rib Studs are readily attached to floors and ceilings with Rib Stud extensions. Rib Lath is wired directly to the studs and plaster applied to the face of the lath on both sides of the partition. Other types of hollow partitions can, of course, be adopted, such as using Rib Lath with other types of studs of wood or steel.

Hy-Rib Ceilings For School Buildings

Suspended ceilings are usually required under roofs of schools and should always be fireproof. For this purpose there is nothing that can compare with the Hy-Rib ceiling. Hy-Rib, as previously described, comes in large sheets combining lath and stiffening channels. In building these suspended ceilings all that is necessary is to provide lines of supports spaced 4 ft. to 6 ft. apart, the Hy-Rib being attached directly to them and plastered on the under side to form the ceiling. The great saving of this simple construction as compared with lath and channels is apparent when one considers the entire elimination of all expense of wiring lath to separate channels.

For ceilings in semi-fireproof construction, Rib-Lath may be attached to the underside of the wood joists and plastered with cement. This produces good fire resistance, which should materially retard the spread of the flames.



Sectional Perspective of Counterbalanced United Steel Sash.

United Steel Casement—Furnished in Many Special Designs and Especially Adapted to School Buildings.

Steel Sash for Windows of Schools

Authorities generally agree that the best lighting for class rooms is from one side of the room only. This means that the maximum lighting value should be secured from the wall on that side and as little space as possible devoted to obstructing members, such as pilasters, mullions and muntin bars. Our modern solid steel sash is ideally suited for this condition, as practically no light is obstructed by the narrow mullions and muntins. The full area of the window opening is available for lighting as contrasted with the old style wood sash, requiring wide frames, wide mullions and wide muntins. These steel sash are also fireproof and permanent.

Even greater lighting value can be obtained from the exterior by combining these steel sash with skeleton frame construction of reinforced concrete, as previously described. In this case the pilasters are reduced to minimum width and the steel windows extend continuously between them and up to the full height of the ceiling. By the use of these modern methods of construction, the daylighting of class rooms has been materially improved, increasing the comfort of the children and saving their eyesight.

Economy Casements of United Steel Sash.
A Type Well Adapted to School Buildings.

United Steel Sash For Windows

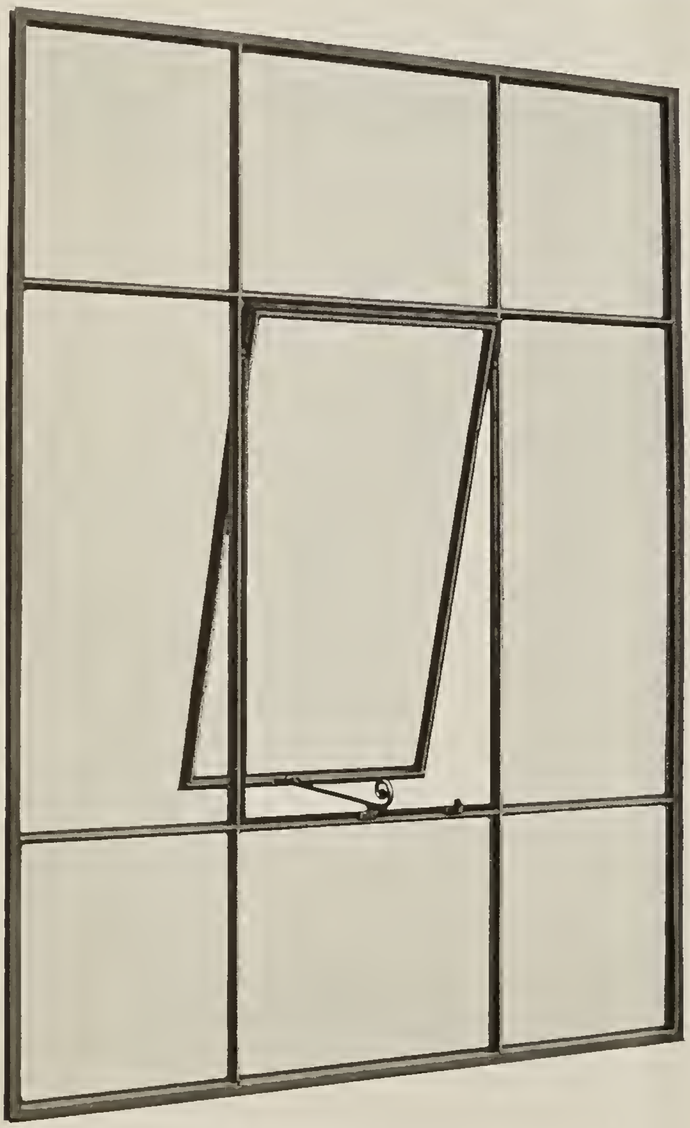
United Steel Sash is an improved type of solid steel sash with maximum daylighting power and strength. The deep narrow members offer practically no obstruction to the light. These steel members are united from solid steel sections under powerful presses without cutting away the metal at the joints, insuring the greatest possible strength and rigidity. All sash are neatly finished and are very attractive in appearance.

United Steel Sash is a complete line to meet all conditions of daylighting and ventilation. Both pivoted and sliding ventilators can be provided. Ventilators may be pivoted just above the center, near the top or the bottom, or also at top and bottom to revolve on a vertical axis. Among vertical sliding sash, four types are provided, the counter-balanced sash in which the upper sash is balanced against the lower; spring counterbalances, lead counterweights and cast-iron counterweights. A complete line of casement sash of all types is also included. All sash are furnished in a large variety of sizes and arrangements.

Our engineers would be glad to make suggestions as to the most suitable steel sash for any particular condition. Our United Steel Sash Hand Book completely describes and illustrates all types of sash, and is sent free to those interested in school building construction.

Price & McLanahan, Architects

United Steel Casements, Indianapolis, Ind. Hinged at Sides to Open Out.



Economy Casements of United Steel Sash Designed for School Buildings.

James Knox Taylor, Supervising Architect.

United Steel Sash with Sliding and Pivoted Ventilators.

Bureau of Printing and Engraving, Washington, D. C.

Waterproofings, Dampproofings and Finishes for Schools.

A dry building is an essential requirement for the proper sanitation of schools. The Trus-Con Laboratories manufacture a complete line of Waterproofings and Dampproofings, which insure absolute insulation from moisture in concrete or masonry construction. For instance, the Trus-Con Waterproofing Paste Concentrated is mixed with the water used in the concrete when the building is built or in a plaster coat on finished buildings, and thus insures an impervious concrete structure.

Where the waterpressure from the soil is very slight, a basement can be made absolutely dry by applying Trus-Con Foundation Coat to the outside walls.

Trus-Con Plaster Bond is a dampproofing product and is applied to the interior of outside walls. While dampproofing is its first function, it serves an additional purpose of forming a bond between the plaster and the wall, as it has a very tacky surface to which plaster will tightly adhere, and thus often does away with furring and lathing.

Trus-Con Stonetex is a liquid, cement, dampproof coating for stucco, concrete, stone, brick or other masonry surfaces. It is so formulated as to perfectly bond with the concrete or other surfaces, and does not crack or peel off like paint. It is furnished in several colors and in addition to dampproofing the structure, adds to its appearance.

During the past few years, there has been much agitation throughout the country over the injurious effect of both lead and oil and cold water paints for the interior decorating of public buildings. Lead and oil is recognized as a poisonous material and water paints scale and peel off, the small particles floating through the air and acting as a germ distributor. Trus-Con Asepticote is a special product formulated for the sanitary finishing of the interiors of schools, hospitals, churches, as well as private residences. It dries with a soft dull finish, and can easily be washed with warm water and soap without in any way affecting its surface.

Trus-Con Floor Enamel is an ideal, dustless, sanitary washable finish for cement floors. When applied with a brush to the floors, it produces a tough, hard, elastic and reasonably durable finish and affords an attractive tile-like enamel finish that insulates and protects the floor from the direct traffic which would otherwise cause continual dusting and granulation of the surface.

The Trus-Con Laboratories manufacture many other Waterproofings, Dampproofings and Technical Paints. We will gladly furnish suggestions as to the best methods for each individual condition, in either new or completed work. Our Trus-Con Hand Book describing these products gives complete specifications, etc., and is sent upon request.

A Few of the Many Schools in Which Kahn System Has Been Used.

The few illustrations shown in this book give only a meager idea of the hundreds of schools in which Kahn Building Products have been used. The following list is only a partial one, but indicates our extensive experience along these lines. We are glad to place this experience at the disposal of those interested in school buildings without obligating them in any way. Our representatives are located in all principal cities and will give direct, personal co-operation at all times.

Names of schools printed in italics have Floors of Floretyle Construction.

ARKANSAS

Helena—High School.
Little Rock—Deaf Mute School.
" " —Little Rock College Dormitory.
Marion—School.

CALIFORNIA

Cerona—Claremont Library—Pomona College.
Chino—High School.
La Jolla—Bishop School (Partitions).
Los Angeles—*East Los Angeles High School.*
" " —Polytechnic High School—Addition.
San Diego—Bishop School.
San Francisco—Bryant Cosmopolitan School.

COLORADO

Boulder—Univ. of Colo.—Memorial Bldg.
Colorado Springs—High School & Mechanical Bldg. Annex.

CONNECTICUT

Bridgeport—School.
" —*Nichols Street School.*
Hartford—*High School.*
New London—Harbor School.
Stamford—High School.
Torrington—*High School.*
Waterbury—School.
Watertown—*Taft School.*
Willimantic—*Natchaug School.*
" —*Windham Street School.*

DISTRICT OF COLUMBIA

Washington—Georgetown School.
" St. John Kantius College.
" —Army Barracks.
" —War College.
" —Gonzago College.
" —Howard Univ.—Science Hall.
" —Holy Cross Academy.

GEORGIA

Macon—Wesleyan College Gymnasium.

IDAHO

Genesee—*School.*
St. Anthonys—Idaho Training School.

ILLINOIS

Arcola—School.
Atlanta—School.
Champaign—High School.
" —Univ. of Illinois—Armory.
Danville—High School.
Decatur—High School.
Granville—*Marks School.*
La Grange—Lyons High School.
Lockport—School.
Monmouth—Wallace Hall—Monmouth College.
" —High School.
Neoga—School.
Peoria—Greeley School.
" —Douglas School.
Quincy—*Jackson School.*
Robinson—School.
Rock Island—Grant School.
" " —Manual Training School.

INDIANA

Attica—School.
Bedford—High School.
Bloomington—Indiana Univ.—Science Bldg.
Broad Ripple—High School.
Brookville—School.
Culver—Culver Military Academy.
Elkhart—School.
Fort Wayne—*St. Paul's Lutheran School.*
" " —Spy Run School.
Indianapolis—School No. 3 Addition.
" —Manual High School.
" —Riverside Drive School.
Lafayette—Smith Hall—Purdue Univ.
Oxford—School.
Rochester—High School.
Rolling Prairie—Interlaken School.
Seymour—High School.
Terre Haute—Davis Park School.

IOWA

Ames—Chemistry Bldg.—State Bd. of Educ.
Boone—High School.
Burlington—High School.
Cedar Falls—Iowa State Normal School.
Council Bluffs—Iowa School for the Deaf.
Davenport—Johnson School.
Des Moines—*Park Ave. School.*
" " —*Highland Park College.*
" " —*Phillips School.*
" " —Iowa State College Buildings.
" " —Hubbell School.
" " —Oakland School.
East Waterloo—*Grade School.*
Estherville—*High School.*
Ft. Dodge—*School.*
" " —Butler School.
Sioux City—Morningside College Gymnasium.
Spencer—*School.*

KANSAS

Atchison—Washington School.
Newton—*High School.*
Wichita—High School.
" —Carleton School.

KENTUCKY

Louisville—*St. Joseph School.*
" —West Chestnut School.
" —Broadway School.
" —St. Boniface School.

LOUISIANA

Baton Rouge—*High School.*
Natchitoches—State Normal School—Dormitory.
New Orleans—Stanley Thomas Hall—Tulane University.
" " —Thomas Hall & Marquette Hall—Loyola College.

MARYLAND

Annapolis—U. S. Naval Hospital.
" —U. S. Naval Academy—Library, Gymnasium and Academic Group.
Baltimore—Notre Dame Academy.
" —Country School for Boys.
" Johns Hopkins Univ. Bldgs.
" —Baltimore City Schools.
" —Mt. Agnes College—Laundry.
Catonsville—St. Charles College.

MASSACHUSETTS

Boston—Blackington School.
Millbury—*School.*
North Adams—Amherst College—Natatorium.
Westfield—*Abner Gibbs School.*

MICHIGAN

Ann Arbor—University of Michigan.
" " Hill memorial.
" " —Dental Bldg.
" " Engineering Bldg.
" " —Club House.
" " —Psychopathic Hospital.
" " —University Shops.
Battle Creek—*No. 10 School.*
" " —High School.
Bay City—St. James School.
Cadillac—School.
Corunna—School.
Craton—School.
Detroit—*Detroit Home & Day School.*
" —St. John's School.
" —Grand River Ave. Grade School.
" —Russell School Addition.
" —Wm. Hillger School.
" —Marsey School.
" —Burton School.
" —Normal Training School.
Escanaba—Escanaba School—Powerhouse.
Flint—3 Grade Schools.
" —School for the Deaf.
Grand Rapids—Oakdale School.
" " —*Alexander St. School Add.*
" " —*East Leonard St. School Add.*
" " —Coldbrook School.
" " —Central High School.
" " —Turner School.
" " —Union High School.
" " Hall St. School.
" " —Sigsbee School.
Greenville—Union School.
Holland—*High School.*
Hudson—School.
Ironwood—Central School.
Ishpeming—School.
Jackson—West Main St. School.
Kalamazoo—East Ave. School.
" —High School.
" —Western State Normal School.
Lansing—Michigan Agricultural College Bldgs.
Ludington—High School.
Marquette—High School.
" —Northern State Normal School.
Monroe—High School.
Mt. Pleasant—Central State Normal School.
Negaunee—Manual Training School.
" —High School.
Pontiac—High School.
Port Huron—High School.
Royal Oak—School.

MINNESOTA

Chisholm—High School.
Fuldna—School.
Rochester—High School.
St. Joseph—St. Joseph Academp Col. Bldg.
St. Paul—Ramsey School.
" " —Murray School.
" " —St. Agatha Academy.
St. Peter—School.

MISSISSIPPI

Hattiesburg—Miss. State Normal School.
Vicksburg—Diocesan School.

MISSOURI

Columbia—Univ. of Mo. Agricultural School.
Gallatin—High School.
Kansas City—Rockhurst College.
Springfield—Boyd School.
" —Robberson School.
" —High School.
St. Louis—Missouri School for Blind.

MONTANA

Billings—*High School.*
Helena—Sisters School.

NEBRASKA

Kearney—Kearney Military Academy.
Lincoln—*Lincoln Business College.*
" —Univ. of Nebr. Industrial Plant.

NEVADA

Reno—High School (Lath)
" —Mt. Rose School (Lath)
" —Orvis Ring School (Lath)

NEW JERSEY

Atlantic City—School (Mass & Atlantic Aves.)
Bloomfield—High School.
Caldwell—*High School.*
Hoboken—High School.
Jersey City—Technical High School.
Kingsland—High School.
Montclair—School.
Newark—Lincoln School.
West Orange—*High School.*

NEW MEXICO

Clovis—School.

NEW YORK

Albany—State Educational Bldg.
Binghamton—Laurel Ave. School.
" —Union High School.
Briar Cliff Manor—Mrs. Dow's School.
Brooklyn—Visitation School.
Buffalo—Broadway School No. 44.
" —St. Adelbert School.
Caldwell—*High School.*
Dunkirk—High School Addition.
Glens Falls—Union High School.
Great Neck, L. I.—*High School.*
Hornell—School.
Ithaca—Cornell Univ. Training House.
Kenmore—School.
LeRoy—High School.
Mt. Vernon—*High School.*
New York—Union Theo. Seminary.
" " —Stadium, City College of New York.
Peekskill—Drum Hill School.
Rochester—*School No. 3.*
" —St. Andrews School.
Rome—*Thomas St. School.*
Southampton, L. I.—*School.*
Syracuse—*Bellevue Heights School.*
" —Syracuse University Bldgs.
—Hall of Chemistry.
—Public Dispensary.
—Carnegie Library.
—Machinery Hall.
—Hall of Natural History.
—Stadium.
—Gymnasium.
Troy—Emma Williard Seminary.
Valhalla—Jennie Clarkson School.
Waverly—*High School.*
West Point—U. S. Military Academy—20 Buildings.

OHIO

Ada—Memorial Bldg., Ohio Northern University.
Akron—Robison Grade School.
" —North Hill School.
" —Portage Path School.
" —South High School.
" —Lincoln School.
" —High School.
" —Bryan School Annex.
" —Frank H. Mason School.
" —Lane Ave. School Annex.
Alliance—High School.
Athens—High School.
" —Training School Ohio University.
Barberton—High School.
Bowling Green—*State Normal School.*
Buchtel—School.
Bucyrus—School.
Canton—St. Maria College.
Carroll—High School.
Carrollton—*School.*
Cleveland—Lincoln High School.
" —St. Michael's School.
" —West High School.
" —St. Procops School.
Columbus—Forestry Bldg., Ohio State Univ.
" —Art Bldg., St. Mary's of the Springs Academy.
Coshocton—High School.
Cuyahoga Falls—School.
Dayton—Trinity School.
Delphos—Jefferson School.
East Liverpool—High School.
East Palestine—School.
Elyria—*Clark St. School.*
Euclid—*Shore High School.*
" —*Euclid High School.*
Fremont—School.
Fulton—Lincoln High Addition.
Hamilton—Lindenwald School.
Lima—*High School.*
Lorain—Groveland School.
McArthur—School.
Mansfield—Hedges Ave. School.
Marion—*Pearl St. School.*
Martinsville—High School.
Marysville—*School.*
Mentor—*School.*
Millersburg—School.
Morrow—School.
Newark—Grant St. School.
" —South Fifth St. School.
" —Stevens St. School.
New Knoxville—*High School.*
New Philadelphia—*High School.*
Niles—Bentley Ave. School.
" —Warren Ave. School.
Oreville—School.
Oxford—Oxford Univ. Bldg.
Piqua—*School.*
Port Williams—*School.*
St. Bernard—High School.
Sandusky—High School.
Springfield—High School.
" —*Warder Park School.*
" —High School Addition.
Van Wert—High School.
Washington C. H.—High School.
Youngstown—Hillman St. School.
" —St. Patrick's School.
" —South High School.
South Solon—*School.*

OKLAHOMA

Ada—School.
Dewey—High School.
Enid—High School.
Lawton—High School.
Muskogee—Ward School.
" —High School.
Oklahoma City—Putnam High School
Pond Creek—School.
Wulburton—School of Mines.

OREGON

Kenton—School.
Portland—*Jamesmore School.*
" —*Ainsworth School.*
" —*Mt. Tabor School.*
" —*Richmond School.*
" —*Sellwood School.*
" —Hoffman School.
" —North Pacific Dental College.
" —Rose City Park School.
" —Failing School.
" —Washington High School Gymnasium.
" —*Reed Institute—Hall of Arts and Science and Dormitory.*
Umatilla—*School.*

PENNSYLVANIA

Allegheny—12th Ward School.
" —E. St. School.
" —Fineview School.
Aspinwall—School.
Doylestown—High School.
Juniatta—School.
Lancaster—7th Ward School
" —8th Ward School.
Morganza—Pa. Reform School.
Overbrook—Dormitory-Phila. Theo. Seminary of St. Charles Boromeo
Philadelphia—*Parochial School—St. Peter and St. Paul Cathedral.*
" —Univ. Museum Addition.
" —Gratz College.
" —Bayard Taylor School.
" —Library Division—School of P. E. Church.
" —Primary School (5th & Nedro).
" —Primary School (22nd & Ritner).
" —William Cullen Bryant School.
" —Alice Cary Reed School.
" —West Philadelphia High School.
" —Academy of Science.
" —*Thomas W. Evans Museum and Dental Institute.*
" —Henry Howard Furness School.
" —John Greenleaf Whittier School.
" —Wm. F. Harrity School.
Pittsburg—2 School Houses.
" —Brookline School.
Reading—Douglas & Weiser Sts. School.
Williamsport—High School.

RHODE ISLAND

Central Falls—Notre Dame School.
Providence—R. I. School of Design.

SOUTH CAROLINA

Florence—S. C. Industrial School.
Greenville—Chicora College.

SOUTH DAKOTA

St. Francis—School for St. Vincent's Mission.

TENNESSEE

Johnson City—*High School.*
Memphis—Evergreen St. School.
" —Fleece Station School.
" —Tennessee State Normal.
" —Snowden School.
" —High School.
" —Lathram St. School.
Sewaunee—Univ. of the South Science Bldg.

TEXAS

Athens—High School.
Dallas—Roof and Dome of Dallas Hall—S. M. Univ.
Denison—High School.
Fort Worth—High School.
" " —10th Ward School.
Henderson—*School.*
Hillsboro—High School.
Houston—Crockett School.
" —High School.
" —*Rusk School.*
" —Rice Institute.
North Fort Worth—School.
San Antonio—*School No. 10 Addition.*
" " —Prospect Hill High School.
San Marcus—*Manual Arts Bldg.*
Segvin—*High School.*
Sherman—*High School.*
" —Science Hall—Austin College.
Texarkana—*Rose Hill Ward School.*
Waco—High School.

UTAH

Logan—Agricultural College.
Price—*Carbon County High School.*
Salt Lake City—Technical High School.
" " " —Hawthorne School.
" " " —Jefferson School.
" " " —Ninth Ave. School.

VIRGINIA

Danville—Roanake Institute.
Newport News—*John W. Daniels School.*
Richmond—High School.
Rosslyn—Holy Cross Academy.

WASHINGTON

Cheney—School.
Everett—*Vocational School.*
Pullman—*Washington State College Bldgs.*
Richland—School.
Spokane—*Boulevard Park School.*
" —*Whittier School.*
" —*Bryant School.*
" —*Marcus Whitman School.*
Tacoma—*St. Leo's School.*

WEST VIRGINIA

Charleston—Garnett School.
Elmgrove—Manual Training School.
Fairmont—*School.*

WISCONSIN

Kenosha—Third Ward School.
Milwaukee—Deaf and Dumb School.
" —Riverside High School.
" —Boys High School—German English Academy.
Superior—High School.
Wauwatosa—Dormitory—Agricultural School.

Ernest Flagg, Architect.

Buildings for U. S. Naval Academy, Annapolis, Md.

Ten Kahn System Buildings in this Group.

Cram, Goodhue & Ferguson, Architects.

Cadet Barracks, U. S. Military Academy, West Point, N. Y.

Twenty Kahn System Buildings in this Group.

McKim, Mead & White, Architects.

War College, U. S. Army, Washington, D. C.

Kahn System Reinforced Concrete Used Throughout.

Albert Kahn, Architect; Ernest Wilby, Assoc.

Hill Memorial Hall, University of Michigan, Ann Arbor, Mich.

Built Kahn System Reinforced Concrete, including Hy-Rib Ceiling in Auditorium.

Donaldson & Meier, Architects.

Dental College, University of Michigan, Ann Arbor, Mich.

Kahn System Reinforced Concrete Used Throughout.

Andry & Bendernagel, Architects.

Stanley Thomas Hall, Tulane University, New Orleans, La.

Built Kahn System Reinforced Concrete.

J. N. Bradford, Architect.

Archaeological and Historical Museum, Ohio State University, Columbus, O.

Built Kahn System Reinforced Concrete. Windows of United Steel Sash and Ceilings of Hy-Rib.

Revels & Hallenbeck, Architects.

Lyman Hall of Natural History and Gymnasium, Syracuse University, Syracuse, N. Y.

Built Kahn System Reinforced Concrete Throughout.

Revels & Hallenbeck, Architects.

Bowne Hall of Chemistry, Syracuse University, Syracuse, N. Y.

Kahn System Reinforced Concrete Used in Many Buildings of this University.

Cram, Goodhue & Ferguson, Architects.

Administration Building, Rice Institute, Houston, Tex.
Built Kahn System Reinforced Concrete.

Debuys, Churchill & Labouisse, Architects.

Thomas Hall and Marquette Hall, Loyolla College, New Orleans, La.
Built Kahn System Reinforced Concrete.

James Knox Taylor, Supervising Architect.

Bureau of Printing and Engraving, Washington, D. C.
This monumental building is equipped throughout with United Steel Sash and is constructed of the Kahn System Reinforced Concrete. The vertical sliding ventilators are operated with lead counterweights.

Doyle & Patterson, Architects.

Reed Institute, Portland, Ore., showing Dormitory Building, Hall of Arts and Science, and Lounging Room.

Kahn System Floretyle Construction used throughout, including Flat Ceilings up to 32 ft. clear span.

Stoughton & Stoughton, Architects.

East Hall, Canton Christian College, Canton, China.
Built Kahn System Reinforced Concrete.

Frank G. Pierson, Architect.

Gonzago College, Washington, D. C.
Floors of 37 ft. Span, built Kahn System Reinforced Concrete.

C. K. Bryant, Architect.

High School, Richmond, Va.

Built Kahn System Reinforced Concrete.

Howell & Thomas, Architects.

Art Building, St. Marys of the Springs Academy, Columbus, Ohio.

Built Kahn System Reinforced Concrete.

Robinson & Campau, Architects.

Central High School, Grand Rapids, Mich.
Kahn System Reinforced Concrete Used Throughout.

Robinson & Campau, Architects.

Union High School, Grand Rapids, Mich.
Kahn System Reinforced Concrete Used Throughout.

H. L. Bass & Co., Architects.

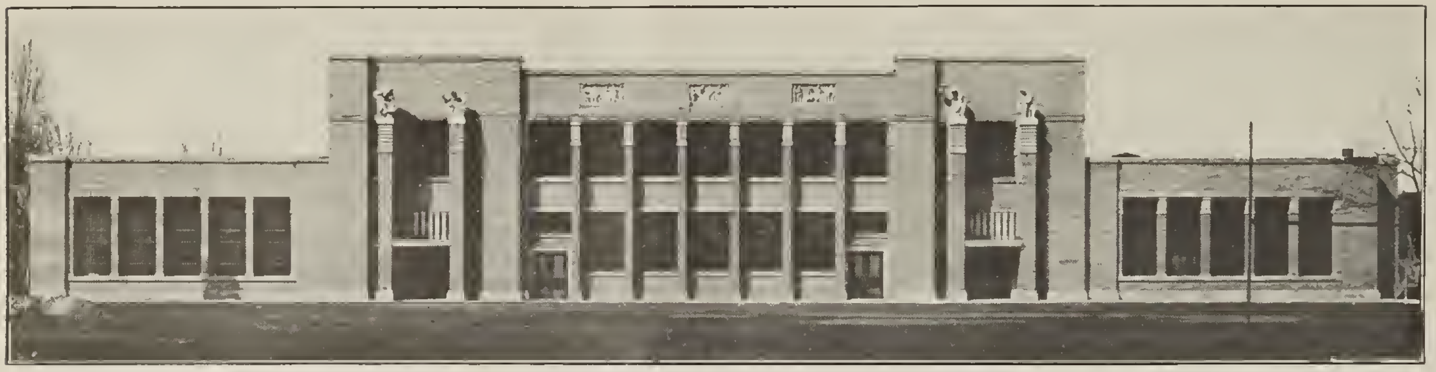
High School, Broad Ripple, Ind.

Built Kahn System Reinforced Concrete.

E. H. Potter, Architect.

Union High School, Glens Falls, N. Y.

Kahn System Reinforced Hollow Tile Construction Used Throughout.



Cannon & Fetzer, Architects.

Technical High School, Salt Lake City, Utah.
Kahn System Reinforced Concrete Used Throughout.

R. K. A. Kletting, Architect.

Jefferson School, Salt Lake City, Utah.
Built Kahn System Reinforced Concrete.

A. Horace Cook, Architect.

West Philadelphia High School, Philadelphia, Pa.
Kahn System Reinforced Concrete Used Throughout.

B. C. Alsup & Co., Architects.

Main Building, Tennessee State Normal School, Memphis, Tenn.
Kahn System Reinforced Concrete Used Throughout.

Whitehouse & Fouilhoux, Architects.

Failing School, Portland, Ore.
Kahn System Reinforced Concrete Used Throughout.

Dallas & Hedges, Architects.

Hawthorne School, Salt Lake City, Utah.
Built Kahn System Reinforced Concrete.

Brubaker & Stern, Architects.

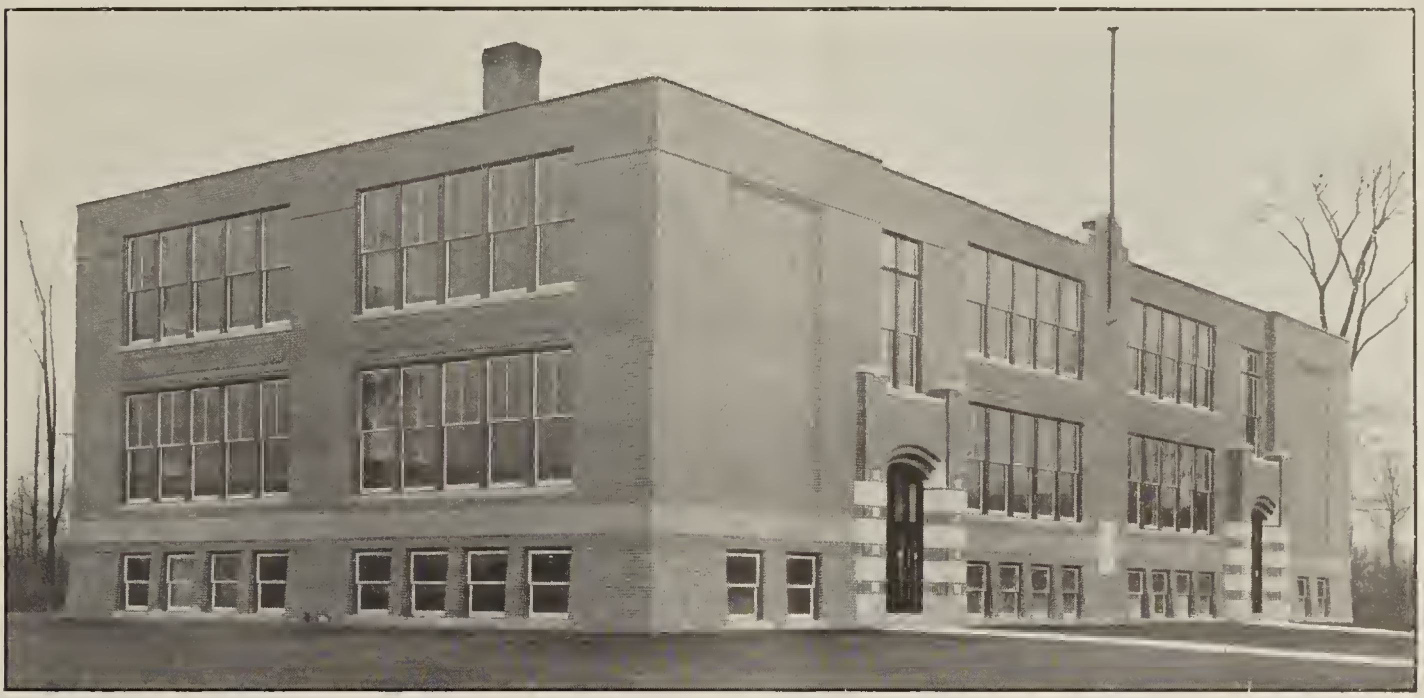
Riverside School, Indianapolis, Ind.

Kahn System Reinforced Concrete Used Throughout.

Malcomson & Higginbotham, Architects.

Marcy School, Detroit, Mich.

Built Kahn System Reinforced Concrete.



Malcomson & Higginbotham, Architects.

Hillger School, Detroit, Mich.
Built Kahn System Reinforced Concrete.

Malcomson & Higginbotham, Architects.

Burton School, Detroit, Mich.
Built Kahn System Reinforced Concrete.

Jones & Furbringer, Architects.

Hill School, Memphis, Tenn.

Kahn System Reinforced Concrete Used Throughout.

O. Z. Cervine, Architect.

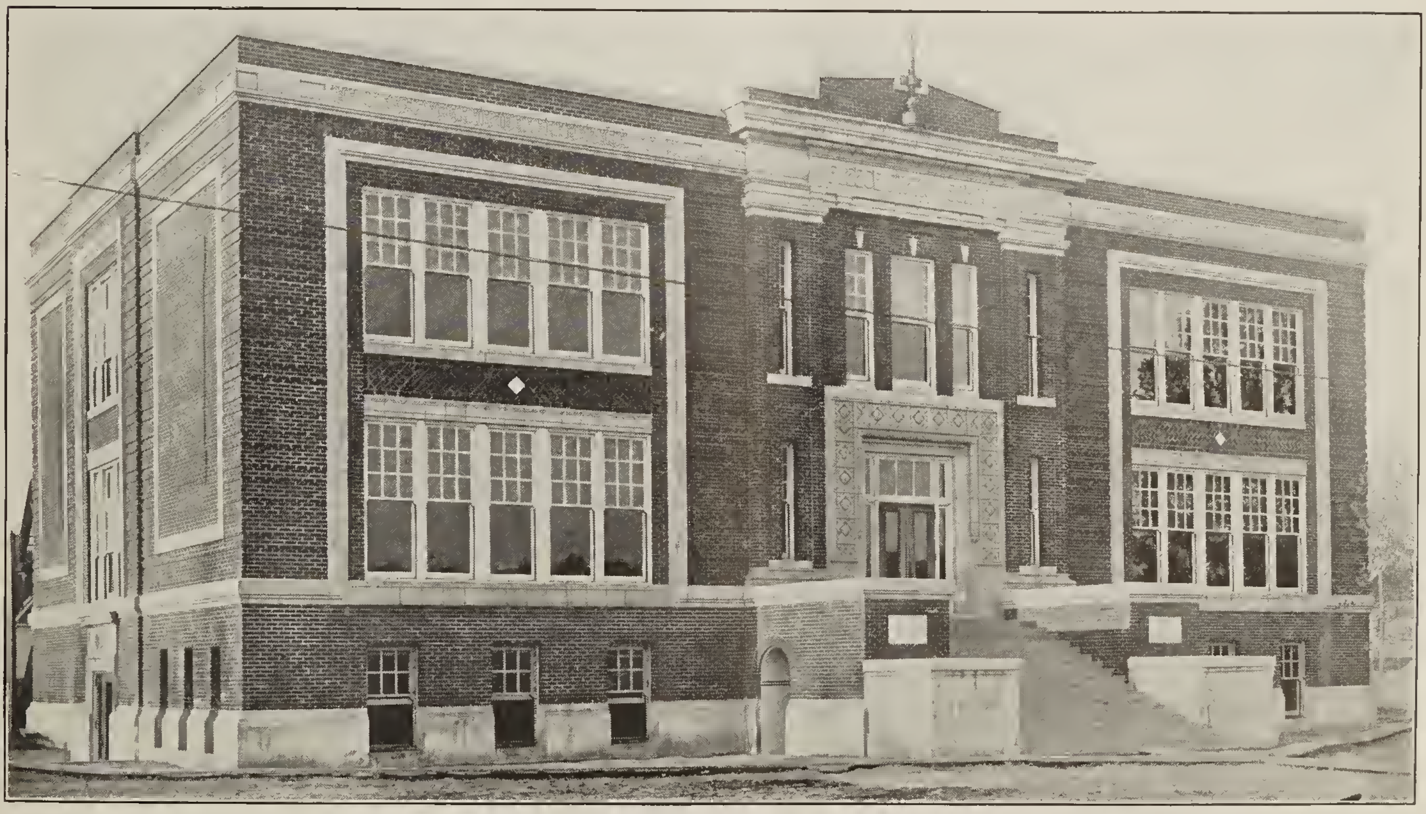
Manual Training School, Rock Island, Ill.

The large windows, assuring perfect daylighting to interiors, are made possible by use of United Steel Sash.

Jones & Furbringer, Architects.

Snowden School, Memphis, Tenn.

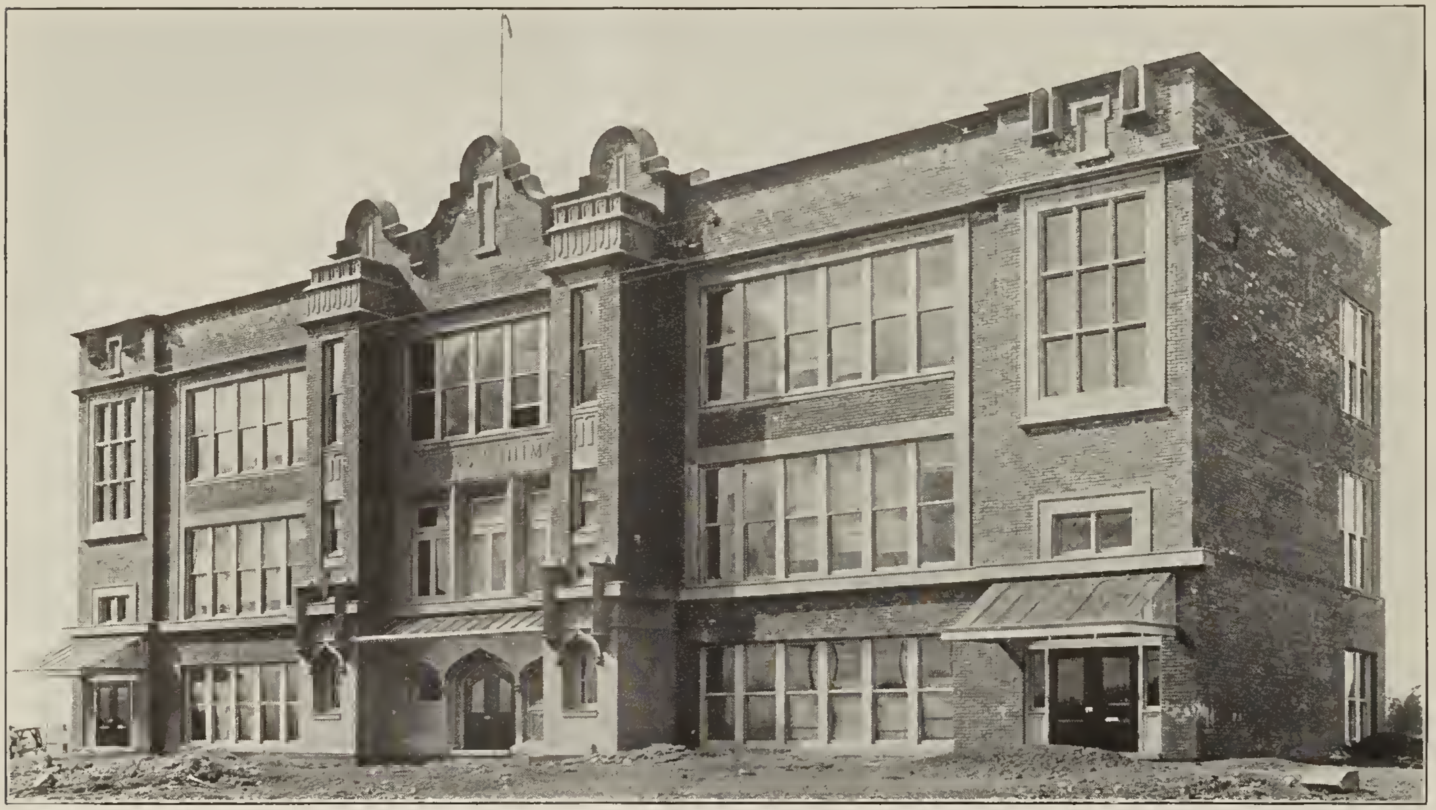
Kahn System Reinforced Concrete Used Throughout.



Jones & Furbringer, Architects.

Fleece Station School, Memphis, Tenn.

Kahn System Reinforced Concrete Used Throughout.



R. C. Sweatt, Architect.

Marcus Whitman School, Spokane, Wash.

Kahn System Floretyle Construction Used Throughout. See test page 7.

Joseph Jacobberger, Architect.

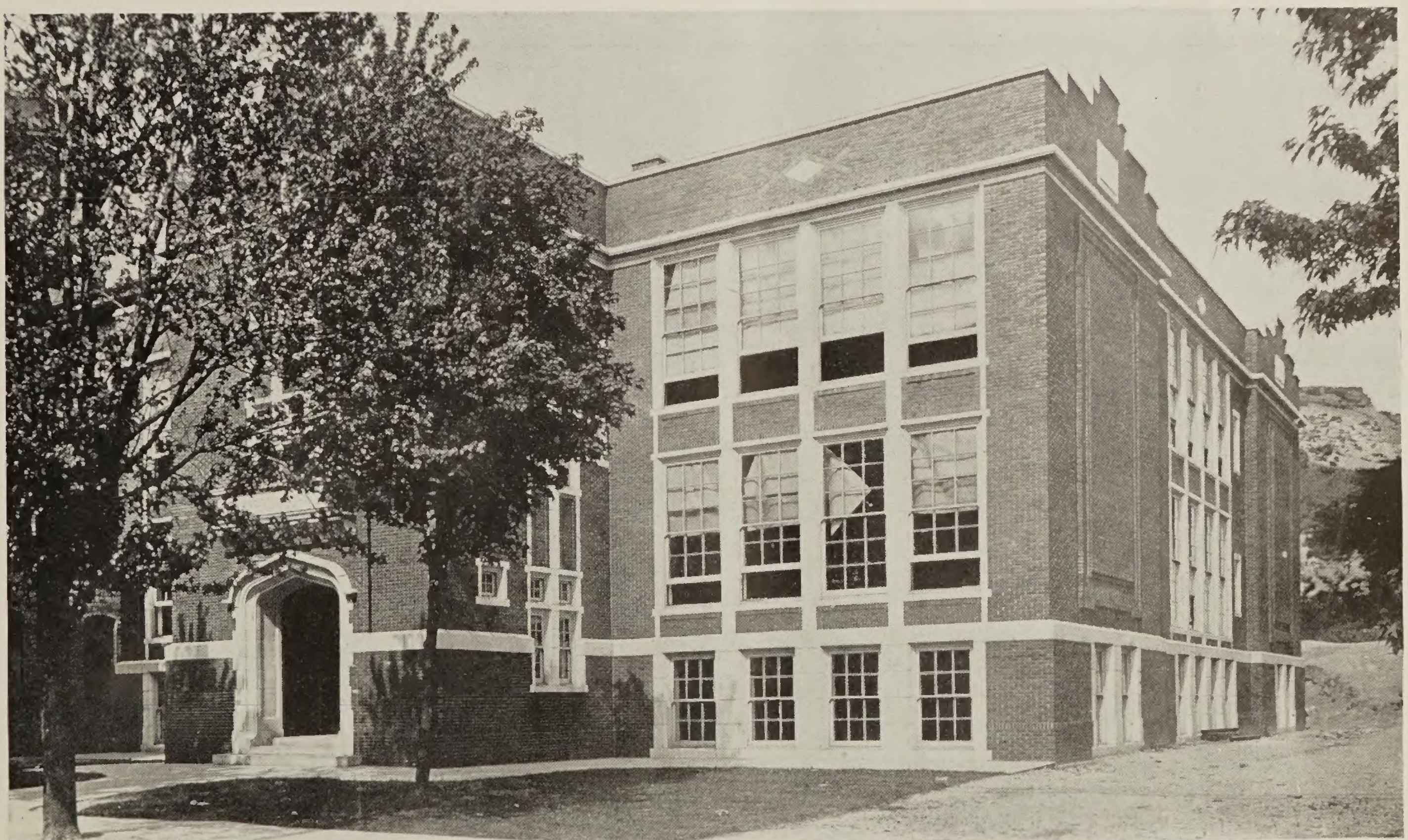
Rose City Park School, Portland, Ore.

Built Kahn System Reinforced Concrete.

F. W. Kirkland, Architect.

Thomas St. School, Rome, N. Y.

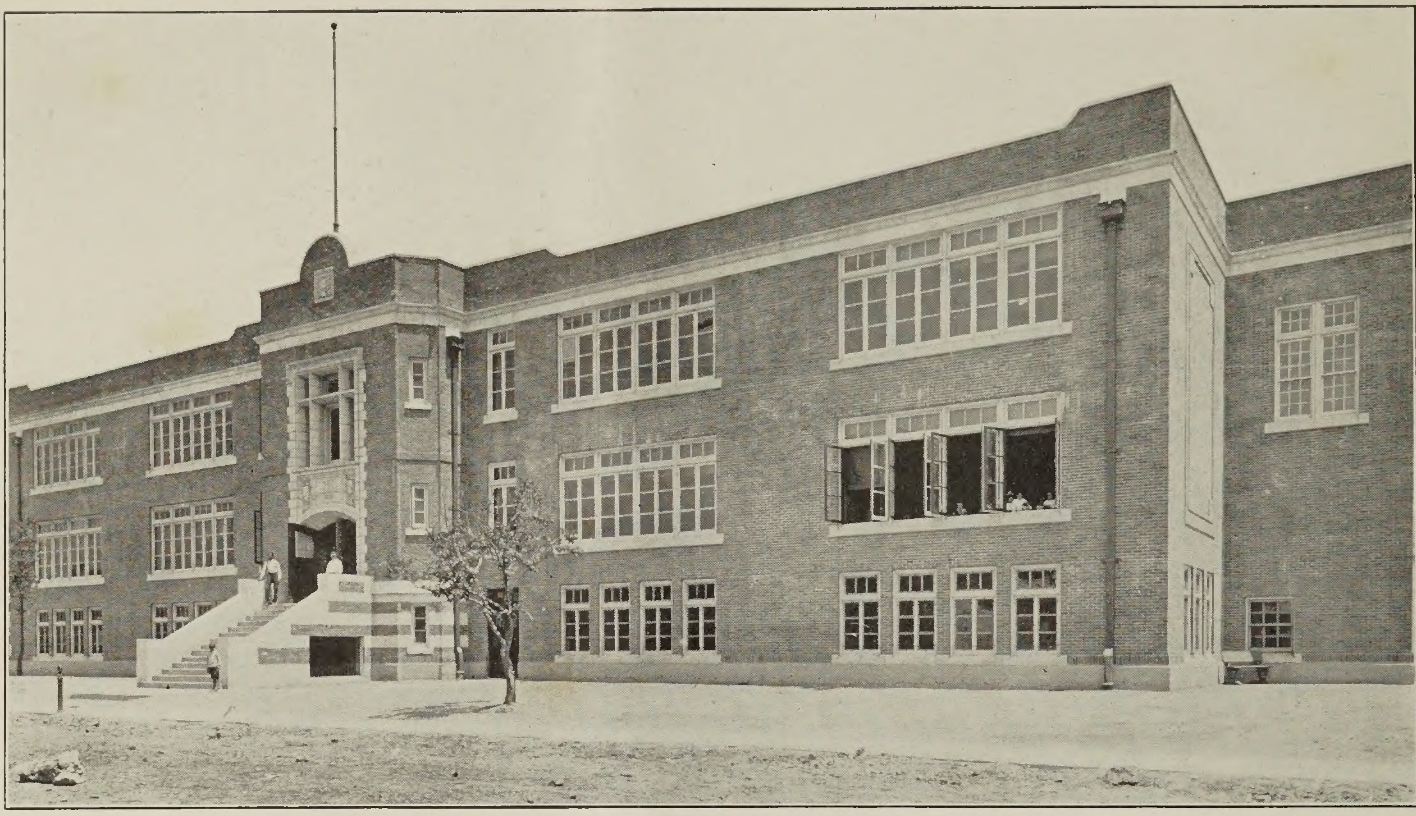
Kahn System Floretyle Construction Used Throughout.



Williamson & Crow, Architects.

Coldbrook School, Grand Rapids, Mich.

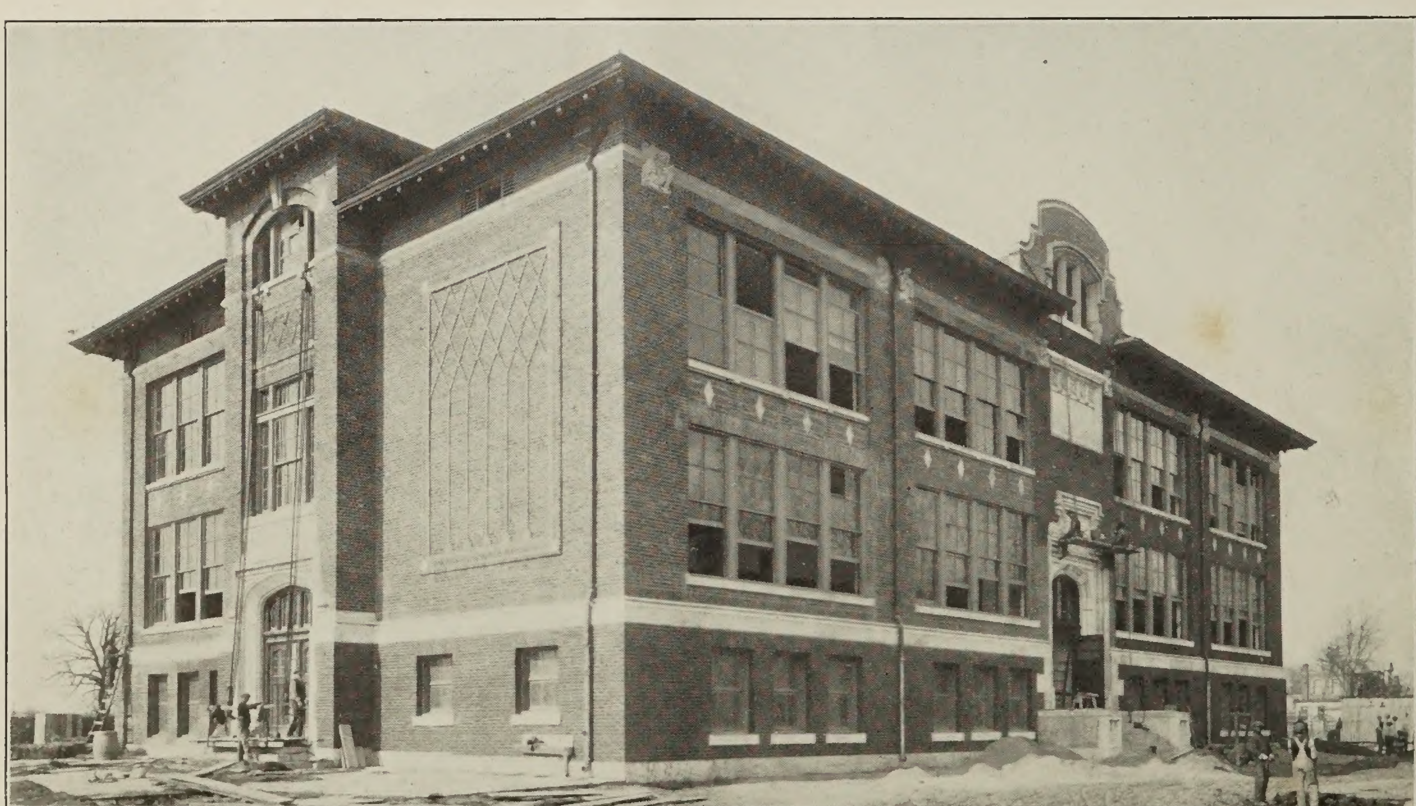
Kahn System Reinforced Concrete Used Throughout.



O. J. Lorehn, Architect.

Rusk School, Houston, Tex.

Kahn System Floretyle Construction Used Throughout.



A. Horace Cook, Architect.

Alice Carey Reed School, 88th St. and Tinicum Ave., Philadelphia, Pa.

Built Kahn System Reinforced Concrete.